

SYSTEM, METHOD, AND COMPUTER PROGRAM PRODUCT FOR  
REPRESENTING OBJECT RELATIONSHIPS IN A  
MULTIDIMENSIONAL SPACE

ABSTRACT OF THE DISCLOSURE

A method and computer product is presented for mapping  $n$ -dimensional input patterns into an  $m$ -dimensional space so as to preserve relationships that may exist in the  $n$ -dimensional space. A subset of the input patterns is chosen and mapped into the  $m$ -dimensional space using an iterative nonlinear mapping process. A set of locally defined neural networks is created, then trained in accordance with the mapping produced by the iterative process. Additional input patterns not in the subset are mapped into the  $m$ -dimensional space by using one of the local neural networks. In an alternative embodiment, the local neural networks are only used after training and use of a global neural network. The global neural network is trained in accordance with the mapping produced by the iterative process. Input patterns are initially projected into the  $m$ -dimensional space using the global neural network. Local neural networks are then used to refine the results of the global network.